UNITED STATES PATENT AND TRADEMARK OFFICE

H' A

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,684	07/31/2003	Magdy Salama	2929-0223P	7661

7590 08/16/2006

Honeywell International Inc.
Law Dept. AB 2
P.O. Box 2245
Morristown, NJ 07962-9806

EXAMINER	
LAXTON, GARY L	
ART UNIT	**PAPER NUMBER**
2838	

DATE MAILED: 08/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/630,684
Filing Date: July 31, 2003
Appellant(s): SALAMA ET AL.

D. Richard Anderson
For Appellant

EXAMINER'S ANSWER

MAILED

AUG 1 6 2006

GROUP 2800

This is in response to the appeal brief filed 5/19/2006 appealing from the Office action mailed 9/06/2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,141,225	Gak et al.	10-2000
5,414,224	Adasko et al.	5-1995
5,289,360	Canova	2-1994
5,138,249	Capel	8-1992
4,893,227	Gallios et al.	1-1990
4,251,857	Shelly	2-1981
3,819,942	Hastwell et al.	1-1990

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 7-12, 18-22, and 24-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shelly (US 4,251,857) in view of Gallios et al. (US 4,893,227).

Claims 1, 7-12, 18-22 and 24-30; Shelly discloses a high-voltage power supply and method, comprising: a power scaling section (10) receiving an input voltage signal (Vin) and converting the input voltage signal to a controllable DC voltage (e.g. C1); a push-pull converter (Q2, Q3) for converting the controllable DC voltage to a high-frequency wave and wherein the generated high-voltage DC output is varied as the controllable DC voltage varies (abstract). The high-frequency wave is a square wave. The high-frequency wave has an amplitude of approximately 0-to-1 kV. The control module is an analog controller. Shelly further discloses: controlling the scaling and converting steps in accordance with a command signal. Shelly further discloses wherein the power scaling section includes a switching element, a duty cycle of which controls the amplitude of the controllable DC voltage, and the control module outputs a gate switching signal to the switching element of the power scaling section as a function of a desired output voltage of the high-voltage power supply. Shelly further discloses wherein the control module receives a feedback signal based on the output of the power scaling section to adjust the gate switching signal. Shelly further discloses wherein the push-pull converter includes a plurality of switching elements and a transformer for generating the high-frequency wave, and the control module outputs gate switching signals to the switching elements of the push-pull converter to control the frequency of the high-frequency wave

However, Shelly does not disclose a voltage multiplier receiving the high-frequency wave generated by the push-pull converter and performing successive voltage doubling operations to generate a high-voltage DC output. Shelly also does not disclose the frequency of the high-frequency wave is approximately 100 kHz or that the power supply generates an output voltage of in the range of approximately 0-to-30 kV, DC

Gallios et al. teaches a two stage full-wave Cockroff-Walton high voltage multiplier 20 for receiving high frequency wave generated by a push pull converter for performing successive voltage doubling operations to generate a high voltage dc output in order to provide high output voltage to a load requiring very high output voltage. Gallios et al. also teach wherein the frequency of the high-frequency wave is approximately 100 kHz (col. 5 line 31) and that high power density is afforded by the high switching frequency used, enabling the use of much smaller, lighter, and lower cost magnetics and capacitors (col. 1 lines 10-25). Gallios et al. further disclose the controllable DC voltage is in the range of approximately 0-to 30 kV.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Shelly to include a voltage multiplier for receiving high frequency wave generated by a push pull converter for performing successive voltage doubling operations to generate a high voltage dc output in order to provide high output voltage to a load requiring very high output voltage as taught by Gallios et al. and to produce the high frequency wave at approximately 100kHz in order to afford high power density by the high switching frequency used, enabling the use of much smaller, lighter, and lower cost magnetics and capacitors. And it would have been obvious to modify Shelly with the teachings of Gallios et al. to produce a high voltage used to power a high voltage load; a voltage high enough, for example, to power a CRT load circuit as taught by Gallios et al.

Claim 31; Shelly discloses a high-voltage power supply, comprising: a power scaling section (10) receiving an input voltage signal (Vin) and converting the input voltage signal to a controllable DC voltage (e.g. C1); a push-pull converter (Q2, Q3) for converting the controllable DC voltage to a high-frequency wave, the high-frequency wave having a frequency;

However, Shelly does not disclose a voltage multiplier receiving the high-frequency wave generated by the push-pull converter and performing successive voltage doubling operations to generate a high-voltage DC output; the generated high-voltage DC output being varied as the controllable DC voltage varies so as to output various desired output voltage levels in a range that includes voltages up to approximately 30kV. Shelly also does not disclose that the frequency is greater than approximately 20 kHz.

Gallios et al. teaches a two stage full-wave Cockroff-Walton high voltage multiplier 20 for receiving high frequency wave generated by a push pull converter for performing successive voltage doubling operations to generate a high voltage dc output in order to provide high output voltage to a load requiring very high output voltage. Gallios et al. also teach wherein the frequency of the high-frequency wave is approximately 100 kHz (col. 5 line 31) and that high power density is afforded by the high switching frequency used, enabling the use of much smaller, lighter, and lower cost magnetics and capacitors (col. 1 lines 10-25). Gallios et al. further disclose the controllable DC voltage is in the range of approximately 0-to 30 kV.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Shelly to include a voltage multiplier for receiving high frequency wave generated by a push pull converter for performing successive voltage doubling operations to generate a high voltage dc output in order to provide high output voltage to a load requiring very high output voltage as taught by Gallios et al. and to produce the high frequency wave at approximately 100kHz in order to afford high power density by the high switching frequency used, enabling the use of much smaller, lighter, and lower cost magnetics and capacitors. And it would have been obvious to modify Shelly with the teachings of Gallios et al.

to produce a high voltage used to power a high voltage load; a voltage high enough, 30kV for example, to power a CRT load circuit as taught by Gallios et al.

Claims 2-6 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shelly (US 4,251,857) and Gallios et al. (US 4,893,227) in view of Gak et al. (US 6,141,225).

Claim 2; Shelly and Gallios et al. disclose the claimed subject matter in regards to claim 1 supra, except for a control module for controlling both the power scaling section and the push pull converter.

Gak et al. teach using one control module (19) for controlling the power scaling section and the push-pull converter.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize one controller to control both the power scaling section and the push pull converter as taught by Gak et al. in place of two separate controllers in order to reduce manufacturing costs.

Claim 3; Gak et al. further disclose wherein the power scaling section includes a switching element (12), a duty cycle of which controls the amplitude of the controllable DC voltage, and the control module outputs a gate switching signal (20) to the switching element (12) of the power scaling section (11) as a function of a desired output voltage of the high-voltage power supply.

Claim 4; Gak et al. further disclose wherein the control module receives a feedback signal (16) based on the output of the power scaling section to adjust the gate switching signal (20).

Claim 5; Gak et al. further disclose wherein the push-pull converter includes a plurality of switching elements (14A, 14B) and a transformer (15) for generating the high-frequency wave, and the control module outputs gate switching signals (CLK-PPA, CLK-PPB) to the switching elements (14A, 14B) of the push-pull converter (13) to control the frequency of the high-frequency wave.

Claims 6 and 23; Gak et al. further disclose the switching elements are MOSFET switching elements.

Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shelly (US 4,251,857) and Gallios et al. (US 4,893,227) in view of Adasko et al. (US 5,414,224).

Claims 13-17; Shelly and Gallios et al. disclose the claimed subject matter in regards to claim 1 supra, except for the voltage multiplier includes voltage doubler stages on a circuit board and the high-voltage power supply further comprises an insulation system associated with the circuit board. And, the insulation system is a multi-layer system of n layers of insulation and m conducting strips positioned between successive insulating layers; wherein the insulation system is a field-controlled multi-layer insulation system. And lastly, the plurality of voltage doubler stages are divided among multiple circuit boards, separate from the power scaling section and the push-pull converter.

First, it has been held that forming in one piece an article which has formerly been formed in two pieces and put together (such as integrating circuit components on a circuit board) involves only routine skill in the art. *Howard v. Detroit Stove works*, 150 U.S. 164 (1893). Therefore, integrating parts on a circuit board is routinely obvious to one having ordinary skill in the art.

Secondly, duplication of parts is well known in the art; since it has bee held that mere duplication of the essential working parts of a device (such as connecting plural circuit boards together) involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. Therefore, duplicating multiple voltage doubler circuit boards is routinely obvious to one having ordinary skill in the art.

In the alternative to the above claim rejections, the following ground(s) of rejection are applicable to the appealed claims:[1]

---

[1] In re Bush, 131 USPQ 263 (CCPA 1961) Judge Rich stated:

"... we deem it to be of no significance, but merely a matter of exposition, that the rejection is stated to be on A in view of B instead of B in view of A, or to term one reference primary and the other secondary...(f)ifteen years ago this court pointed out in In re Cowles...70 USPQ 419...that such differing form of expression did not constitute different grounds of rejection, were of little consequence, and that basing arguments on them "was attempting to make a mountain out of a mole-hill."

Similarly, in In re Boyer, 150 USPQ 441 (CCPA 1966) Acting Chief Judge Rich held that there was no change in the ground of rejection to change the rejection from Aghnides or Miller each taken with or without Harris to a rejection based on Harris alone.

In a recent unpublished Board decision, Appeal No. 95-3666, Serial No. 07/815,000, September 16, 1996. APJ Smith changed a rejection from A in view of B, C and D to a rejection based on D in view of A. He held there was no change in the ground of rejection because "our position is still based on the collective teachings of the references and does not constitute a new ground of rejection," citing Bush and Boyer.

Claims 1, 7-12, 18-22, and 24-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gallios et al. (US 4,893,227) in view of Shelly (US 4,251,857).

Claims 1, 7-12, 18-22 and 24-30; Gallios et al. disclose a high-voltage power supply, comprising: a push-pull converter (e.g. 10) for converting a DC voltage to a high-frequency wave (e.g. T10); and a voltage multiplier (e.g. 20) receiving the high-frequency wave generated by the push-pull converter and performing successive voltage doubling operations to generate a high-voltage DC output, the generated high-voltage DC output being varied as the DC voltage varies (e.g. abstract lines 23-26; fig 1; col. 2 lines 57 and 58; col. 4 lines 33 and 34; col. 9 lines 46-64) .

However, Gallios et al. do not disclose a power scaling section receiving an input voltage signal and converting the input voltage signal to a controllable DC voltage.

Shelly expressly teaches (e.g. col. 1 lines 1 and 2) that it is known in the art to provide regulated DC power to a load using an inverter power supply (e.g. as in Gallios et al.). Shelly further expressly teaches using a power supply with two power sections: the first is a DC-DC chopper converter expressly for converting a high voltage unregulated DC input voltage to a lower regulated DC voltage to be used by a second power stage comprising a conventional inverter section which receives the regulated DC output voltage from the chopper and converts that voltage to a semi-regulated DC output voltage (col. 1 lines 1 and 2; col. 2 lines 2-6).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gallios et al. to include a power scaling section (e.g. a DC chopper) receiving an input voltage signal and converting the input voltage signal to a controllable DC voltage as expressly taught by Shelly in order to convert a high voltage

unregulated DC input voltage to a lower regulated DC voltage to be used by an inverter section that receives the regulated DC output voltage from the chopper and converts that voltage to a regulated DC output voltage for use by the load.

Claim 31; Gallios et al. disclose a high-voltage power supply, comprising: a push-pull converter for converting a DC input voltage to a high-frequency wave, the high-frequency wave having a frequency greater than approximately 20 kHz; and a voltage multiplier receiving the high-frequency wave generated by the push-pull converter and performing successive voltage doubling operations to generate a high-voltage DC output, the generated high-voltage DC output being varied as the DC voltage varies so as to output various desired output voltage levels in a range that includes voltages up to approximately 30kV (col. 1 lines 17-26; col. 5 lines 12-15; col. 5 lines 31 and 38-40; col. 7 lines 23-25; col. 9 lines 33-48; col. 11 lines 15-20 and lines 30-37).

However, Gallios et al. do not disclose a power scaling section receiving an input voltage signal and converting the input voltage signal to a controllable DC voltage.

Shelly expressly teaches (e.g. col. 1 lines 1 and 2) that it is known in the art to provide regulated DC power to a load using an inverter power supply (e.g. as in Gallios et al.). Shelly further expressly teaches using a power supply with two power sections: the first is a DC-DC chopper converter expressly for converting a high voltage unregulated DC input voltage to a lower regulated DC voltage to be used by a second power stage comprising a conventional inverter section which receives the regulated DC output voltage from the chopper and converts that voltage to a semi-regulated DC output voltage (col. 1 lines 1 and 2; col. 2 lines 2-6).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gallios et al. to include a power scaling section (e.g. a DC

chopper) receiving an input voltage signal and converting the input voltage signal to a controllable DC voltage as expressly taught by Shelly in order to convert a high voltage unregulated DC input voltage to a lower regulated DC voltage to be used by an inverter section that receives the regulated DC output voltage from the chopper and converts that voltage to a regulated DC output voltage for use by the load.

Claims 2-6 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gallios et al. (US 4,893,227) and Shelly (US 4,251,857) in view of Gak et al. (US 6,141,225).

Claim 2; Gallios et al. and Shelly disclose the claimed subject matter in regards to claim 1 supra, except for a control module for controlling both the power scaling section and the push pull converter.

Gak et al. teach using one control module (19) for controlling the power scaling section and the push-pull converter.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize one controller to control both the power scaling section and the push pull converter as taught by Gak et al. in place of two separate controllers in order to reduce manufacturing costs.

Claim 3; Gak et al. further disclose wherein the power scaling section includes a switching element (12), a duty cycle of which controls the amplitude of the controllable DC voltage, and the control module outputs a gate switching signal (20) to the switching element

(12) of the power scaling section (11) as a function of a desired output voltage of the high-voltage power supply.

Claim 4; Gak et al. further disclose wherein the control module receives a feedback signal (16) based on the output of the power scaling section to adjust the gate switching signal (20).

Claim 5; Gak et al. further disclose wherein the push-pull converter includes a plurality of switching elements (14A, 14B) and a transformer (15) for generating the high-frequency wave, and the control module outputs gate switching signals (CLK-PPA, CLK-PPB) to the switching elements (14A, 14B) of the push-pull converter (13) to control the frequency of the high-frequency wave.

Claims 6 and 23; Gallios et al. and Gak et al. disclose switching elements that are MOSFET switching elements.

Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gallios et al. (US 4,893,227) and Shelly (US 4,251,857) in view of Adasko et al. (US 5,414,224).

Claims 13-17; Gallios et al. and Shelly disclose the claimed subject matter in regards to claim 1 supra, except for the voltage multiplier includes voltage doubler stages on a circuit board and the high-voltage power supply further comprises an insulation system associated with the circuit board. And, the insulation system is a multi-layer system of n layers of insulation and m conducting strips positioned between successive insulating layers; wherein the insulation system is a field-controlled multi-layer insulation system. And lastly, the plurality of voltage doubler

stages are divided among multiple circuit boards, separate from the power scaling section and the push-pull converter.

It has been held that forming in one piece an article which has formerly been formed in two pieces and put together (such as integrating circuit components on a circuit board) involves only routine skill in the art. *Howard v. Detroit Stove works*, 150 U.S. 164 (1893). Integrating parts on a circuit board is, therefore, routinely obvious to one having ordinary skill in the art. Gallios et al. does disclose that the voltage doubler is a two stage doubler. It would have been obvious to one having ordinary skill in the art at the time the invention was made to integrate each stage on a separate board in order to be capable of adding additional boards to accommodate the desired multiplication factor for the particular load; since it has been held that mere duplication of the essential working parts of a device (such as connecting plural circuit boards together) involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. Therefore, duplicating the multiple integrated voltage doubler circuit boards would be routinely obvious to one having ordinary skill in the art.

(10) Response to Argument

Applicant's arguments have been fully considered but they are not persuasive.

A. Issue 1: *Shelly* in view of *Gallios* establishes *Prima Facie* Obviousness

1. Argument Summary

The reasoning provided in support of the rejection of the claims under 35 USC §103(a) as being unpatentable over *Shelly* in view of *Gallios* (as well as *Gallios et al.* in view of *Shelly*, supra) establishes *prima facie* obviousness for rejected claims 1, 7-12, 18-22 and 24-31. Specifically, the combination of *Shelly* and *Gallios* provide the claimed invention and further establish sufficient motivation for one of ordinary skill in the art to modify or combine the teachings of *Shelly* and *Gallios* in a manner that satisfies all claim limitations.

2. Motivation to combine

The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). Additionally, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

3. The Rejection Establishes *Prima Facie* Obviousness of Independent Claim 31

Concerning independent claim 31, the applicant first takes issue with the teaching reference *Gallios*. More specifically, applicant maintains that *Gallios* does not disclose the specific high frequency wave output from the push pull inverter to the voltage multiplier of claim 31.

Gallios does, in fact, fully disclose the claimed high frequency wave output from the push pull inverter to the voltage multiplier of claim 31. Moreover, *Gallios et al.* even expressly state that use of high frequency affords the use of much smaller, lighter, and lower cost magnetics (e.g. transformers) and capacitors (col. 1 lines 17-20). However, the applicant argues that the examiner pointed to the switching frequency of transistors in the power stage 20 which includes transformer 10 instead of the frequency of a wave output by the transformer in the push pull inverter. The next logical question then becomes, how else is the frequency wave generated if not by the switching and the switching frequency of the transistors that are driving the transformer? In fact, it is the switches that drive the transformer that create the output wave from the transformer. For example, this concept is clearly disclosed in *Gallios et al.* column 4 lines 14-29 and column 9 lines 33-40. Furthermore, *Gallios et al.* explain that when the transistors are off the secondary side of the transformer is essentially disconnected or isolated from the transformer windings (see col. 10 ;lines 50-53). Therefore, the way to produce a waveform from a transformer driven by a push pull inverter is to switch the switches to apply the input voltage to the transformer at any switching frequency. And, it naturally

follows then, that the faster the switches are switched (e.g. high switching frequency), the higher frequency of the transformer output wave.

Secondly, the applicant takes issue with the motivation of why one of ordinary skill in the art would incorporate the particular transistor switching frequency of *Gallios* in the power supply of *Shelly*. Column 1 lines 17-20 of *Gallios*, expressly teach that "high power density is afforded by the high switching frequency used, enabling the use of much smaller, lighter, and lower cost magnetics and capacitors."

Third, the applicant takes issue with the motivation of why one of ordinary skill in the art would incorporate a voltage multiplier by *Gallios* in the power supply of *Shelly*. Again, *Gallios* provides express motivation; column 2 lines 19-22 expressly state that switchmode converters are commonly used to power electronic systems (col. 1 lines 11-13). Such power supplies as this are found in TV sets (see *Gallios* col. 2 line 15). *Gallios* goes on to state these power supplies provide the alternate polarity energy pulses to the load required by high voltage multipliers used in CRT type high voltage converters (col. 2 lines 19-22). Furthermore, the voltage multiplier is such a well known device that it is given the name "Cockroff-Walton" high voltage multiplier. Therefore, it would been obvious to modify *Shelly* to include a voltage multiplier in order to power an electronic system such as those found in TV sets that requires high voltage and high output power as taught by *Gallios*.

Next, the applicant argues that combining *Gallios* and *Shelly* would require "significant redesign of the power conversion elements." The examiner respectfully disagrees. First in response to this argument, the test for obviousness is not whether

the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. (emphasis) See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Besides, the voltage multiplier is a passive circuit. It does not require additional complicated control circuitry connected therewith; in fact, the voltage multiplier could simply connect to the transformer as shown in *Gallios* to replace the full wave rectifier of *Shelly* (please see also, col. 4 lines 35-38 of *Gallios*). There would be no significant redesign at all. The sensing circuit 14 the applicant cites and argues over from *Shelly* would not be affected since the sensing circuit is a primary side circuit which senses the primary side current and controls the chopper converter section 10 (e.g. the power scaling section); thus, the sensing circuit has nothing to do with the secondary side of the transformer and would not affect operation of a voltage multiplier nor would the voltage multiplier affect the sensing circuit likewise.

Lastly, the applicant argues the combination of *Gallios et al.* and *Shelly* is based on impermissible hindsight. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a

reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Surly, as explained above, *Shelly* and *Gallios et al* provide sufficient knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure; therefore, such a reconstruction is proper since it is clear that the examiner exactingly relied on the suggestions and motivations found in the prior art.

4. The Rejection Establishes *Prima Facie* Obviousness of Independent Claims 1 and 18

Concerning claims 1 and 18, the applicant takes issue with the primary reference *Shelly*. Specifically, applicant asserts that *Shelly* does not disclose that inverter 12 outputs a high frequency wave. The applicant further argues that the proper interpretation of the term "high frequency" must be consistent with the interpretation that those skill in the art would reach and should be consistent with the specification.

First, the scope of the term is not understood when read in light of the specification. The applicant's specification does not set a definitive standard or unequivocally define the term "high frequency". Actually, the specification is unclear since it mentions more than one frequency. Second, the applicant has not claimed or disclosed what the applicant believes to be high frequency. Thus, the examiner merely relied on the prior art to illustrate that the frequency at which the power supply of *Shelly* operates at, and given the fact that *Gallios et al.*, as well, disclose that conventional power supplies nominally operate at high frequencies, especially since that results in the use of smaller circuit components (see *Gallios et al.* col. 1 lines 17-20, col. 5 lines

32 and 38-40; col. 11 lines 31-37). Therefore, operating at high frequency is not novel in the art and, in fact, is well known to those skilled in the art to be very conventional.

5. The Rejection Establishes *Prima Facie* Obviousness of Dependent Claim 7 or 24

The applicant argues that that the converter of *Shelly* does not generate a high frequency square wave. First, as noted above, the term "high frequency" is a relative term and the examiner would again apply the same argument above concerning the term "high frequency" to this instance as well. Second, generating a square wave with an inverter is not a novel feature. Third, *Shelly* does, in fact, disclose generating a square wave in figure 2 (e.g. secondary winding currents: i_9 and i_{10}).

B. <u>Issue 2</u>: *Shelly* in view of *Gallios* and *Gak* establishes *Prima Facie* Obviousness as applied to claims 2-6 and 23.

1. Argument Summary

Shelly in view of *Gallios* and *Gak* fully disclose the claimed invention as addressed in the argument concerning claim 1 and the rejection under 35 U.S.C §103(a) of claims 2-6 and 23.

C. <u>Issue 3</u>: *Shelly* in view of *Gallios* and *Adasko* establishes *Prima Facie* Obviousness as applied to claims 13-17.

1. Argument Summary

Shelly in view of *Gallios* and *Adasko* fully disclose the claimed invention as addressed in the argument concerning claim 1 and the rejection under 35 U.S.C §103(a) of claims 13-17.

2 The Rejection Establishes *Prima Facie* Obviousness of Dependent Claim 14.

In this instance, the applicant argues that *Adasko* fails to teach the insulation arrangement of claim 14, in particular, a multi-layer system of *n* layers of insulation and *m* strips positioned between successive insulating layers. With cursory review of *Adasko*, it is noted that printed circuit boards are known to comprise *n* layers of insulation and *m* strips positioned between successive insulating layers, these limitations are fully disclosed in *Adasko* column 1 lines 43-56. Therefore, the structure and composition of applicant's circuit is conventional and not a novel feature as expressly illustrated in *Adasko*.

3. The Rejection Establishes *Prima Facie* Obviousness of Dependent Claim 16

The applicant argues that the combination of references do not disclose a plurality of voltage doubler stages being divided among multiple circuit boards separate from the power supply.

Gallios et al. does disclose that the Cockcroff-Walton high voltage multiplier is a two stage full wave multiplier. The examiner asserts that it would have been obvious to integrate each stage on a circuit board given the fact that forming an article in one piece (e.g. one circuit board) which has formerly been formed in two pieces (e.g. the separate diode and capacitor components) involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893). Furthermore, it would have been obvious to duplicate the numerous stages in order to provide the necessary multiplication factor

since mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. Additionally, it would have been obvious to separate the power supply from the multiplier since constructing a formerly integral structure in various elements involves only routine skill in the art. *Nerwin v. Erlichman*, 168 USPQ 177, 179. Therefore, it would have been obvious to one skilled in the art to integrate the separate diode and capacitor components of each stage as a separate integrated circuit board and to duplicate the number of integrated stages in order to generate the appropriate multiplication factor; and, it would have been routine to keep the multiplier boards separate from the power supply circuit board in order to maintain the capability of adding or subtracting the multiplication integrated circuit boards to adjust the multiplication factor.

4. The Rejection Establishes *Prima Facie* Obviousness of Dependent Claim 17

Lastly, the applicant argues that the combination of references do not disclose a plurality of voltage doubler stages on a circuit board and comprising an insulation system in the circuit board and the doubler stage includes capacitors arranged in a pattern in which adjacent capacitors are non-parallel.

Again, *Gallios* et al. does disclose that the Cockcroff-Walton high voltage multiplier is a two stage full wave multiplier. The examiner asserts that it would have been obvious to integrate each stage on a circuit board given the fact that forming an article in one piece (e.g. one circuit board) which has formerly been formed in two pieces (e.g. the separate diode and capacitor components) involves only routine skill in

the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893). Furthermore, it would have been obvious to duplicate numerous stages in order to provide the necessary multiplication factor since mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. Additionally, it would have been obvious to separate the power supply from the multiplier since constructing a formerly integral structure in various elements involves only routine skill in the art. *Nerwin v. Erlichman*, 168 USPQ 177, 179. Moreover, assuming the applicant means the capacitors are not connected in parallel by the term "non-parallel", the examiner notes that the Cockroff-Walton multiplier comprises capacitors arranged in a non-parallel configuration and connected in substantially the same way as the applicant's and therefore, the multiplier would be integrated on a circuit board in similar configuration, that is in a non-parallel connected manner, in order to properly operate as a Cockroff-Walton multiplier normally does. Therefore, this feature is not a novel feature and only involves routine skill in the art.

D. CONCLUSION

It has been shown conclusively that the references cited by the examiner fully disclose the claimed invention and clearly demonstrate that the asserted modifications or combinations of the prior art are supported by the teachings, suggestions, and motivations in the applied references and in the knowledge generally available to one skilled in the art. Moreover, the prior art suggests and supports the desirability of the modifications to thereby establish a *prima facie* case of obviousness. Additionally, the prior art collectively suggests and points to the claimed invention to further support a finding of obviousness. Finally, when considering the differences between the references and the claimed invention, the question for assessing obviousness was not whether the differences themselves would have been obvious, but instead whether the claimed invention as a whole would have been obvious. The examiner prays the Board finds that indeed the claimed invention as a whole would have been obvious as made evident in this appeal in a manner that satisfied all claim limitations.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Gary L Laxton

Conferees:

Darren Schuberg

Karl Easthom 8\10\6